

**REMARKS**

This is in full and timely response to the non-final Office Action mailed on August 18, 2004. Reexamination in light of the amendments and the following remarks is respectfully requested.

**I. Priority**

Priority under 35 U.S.C. §119 has been claimed. Accordingly, acknowledgement of the priority claim and receipt of certified copy of priority documents is respectfully requested.

**II. Rejection under 35 U.S.C. §102(b)**

**Claims 1-7**

Claims 1-7 have been rejected under 35 U.S.C. §102(b) as being clearly anticipated by Cukauskas et al., U.S. Statutory Invention Registration No.H873. The rejection is respectfully traversed for at least reasons discussed below.

Independent claim 1 recites:

A method for forming a Josephson junction, the method comprising the following steps of: forming a two-layer film having an amorphous MgO layer and a high orientation MgO layer on a Si substrate; and laminating an NbN film or an NbCN film on the two-layer film.

Independent claim 4 recites:

A Josephson junction comprising: a Si substrate; a two layer film comprising an amorphous MgO layer and a high orientation MgO layer on the Si substrate; and a an NbN film or a an NbCN film laminated on the two layer film.

Independent claim 6 recites:

A Josephson junction array comprising: at least one Josephson junction comprising a Si substrate, a two layer film comprising an amorphous MgO layer and a high orientation MgO layer on the Si substrate, and an NbN film or an NbCN film laminated on the two layer film.

Cukauskas et al. arguably discloses fabrication of NbN based electronic devices with silicon barriers. However, Cukauskas et al. fails to disclose teach or suggest a step of “forming a two-layer film having an amorphous MgO layer and a high orientation MgO layer on a Si substrate” as recited in claim 1 or “a two layer film comprising an amorphous MgO layer and a high orientation MgO layer on the Si substrate” as recited in claims 4 and 6 respectively.

That is, Cukauskas et al. does not disclose a silicon substrate. Instead, Cukauskas et al especially discloses a sapphire substrate 10.

Further, Cukauskas et al. does not disclose the two layer film having an amorphous MgO layer and a high orientation MgO layer. Instead, Cukauskas et al. discloses two silicon passivation layers 14 and 18 and an amorphous MgO barrier.

Thus, Cukauskas et al. does not anticipate claims 1, 4, and 6. Accordingly, Applicant respectfully requests that the rejection of claims 1, 4 and 6 under 35 U.S.C. §102 be withdrawn, and these claims be allowed.

Further, Applicant respectfully requests that dependent claims 2, 3, 5 and 7 are allowable for at least the reasons that the respective base claims are allowable. Accordingly, withdrawal of the rejection of claims 2, 3, 5 and 7 is respectfully requested.

### **III. Rejection under 35 U.S.C. §103(a)**

#### Claims 8 and 9

Claims 8 and 9 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Hamilton et al. (U.S. Patent No. 5,565,866) in view of Cukauskas et al. The rejection is respectfully traversed for at least reasons discussed below.

Independent claim 8 recites:

A digital to analog converter comprising: Josephson junction arrays comprising Josephson junctions, wherein at least one of the Josephson junctions comprises a Si substrate, a two layer film comprising an amorphous MgO layer and a high orientation MgO layer on the Si substrate, and an NbN film or an NbCN film laminated on the two layer film.

However, as discussed above, Cukauskas et al. fails to disclose teach or suggest “a two layer film comprising an amorphous MgO layer and a high orientation MgO layer on the Si substrate.” Thus, Cukauskas et al. does not anticipate claim 8. Accordingly, Applicants respectfully requests that the rejection of claim 8 under 35 U.S.C. §103(a) be withdrawn, and the claim be allowed.

Further, Applicant respectfully submits that claim 9 depending on claim 8 is allowable for at least the reasons that the respective base claim 8 is allowable. Withdrawal of the rejection of claim 9 is respectfully requested.

#### Claims 10-19

Claims 10-19 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Przybysz et al. (U.S. Patent No. 5,798,722) in view of Cukauskas et al. The rejection is respectfully traversed for at least reasons discussed below.

Independent claim 10 recites:

A Josephson voltage generating apparatus comprising: a digital to analog converter comprising junction arrays for programmable converter using Josephson junctions, wherein at least one of the Josephson junctions comprises a Si substrate, a two layer film comprising an amorphous MgO layer and a high orientation MgO layer on the Si substrate, and an NbN film or an NbCN film laminated on the two layer film.

Independent claim 12 recites:

A Josephson voltage standard apparatus comprising: a digital to analog converter comprising junction arrays for programmable converter using at least one Josephson junction, wherein at least one of the Josephson junctions comprises a Si substrate, a two layer film

comprising an amorphous MgO layer and a high orientation MgO layer on the Si substrate, and an NbN film or an NbCN film laminated on the two layer film.

Independent claim 14 recites:

A superconducting sub-millimeter wave oscillator, comprising: at least one Josephson junction comprising a Si substrate, a two layer film comprising an amorphous MgO layer and a high orientation MgO layer on the Si substrate, and an NbN film or an NbCN film laminated on the two layer film.

Independent claim 16 recites:

A superconducting quantum interference device, comprising: at least one Josephson junction comprising a Si substrate, a two layer film comprising an amorphous MgO layer and a high orientation MgO layer on the Si substrate, and an NbN film or an NbCN film laminated on the two layer film.

Independent claim 18 recites:

A superconductivity digital integrated circuit comprising: at least one Josephson junction comprising a Si substrate, a two layer film comprising an amorphous MgO layer and a high orientation MgO layer on the Si substrate, and an NbN film or an NbCN film laminated on the two layer film.

However, as discussed above, Cukauskas et al. fails to disclose teach or suggest “a two layer film comprising an amorphous MgO layer and a high orientation MgO layer on the Si substrate” as recited in claims 10, 12, 14, 16, and 18 respectively. Thus, Cukauskas et al. does not anticipate claim 10, 12, 14, 16, and 18. Accordingly, Applicants respectfully requests that the rejection of the claims under 35 U.S.C. §103(a) be withdrawn, and the claims be allowed.

Further, Applicant respectfully submits that dependent claims 11, 13, 15 17 and 19 are allowable for at least the reasons that the respective base claims are allowable. Withdrawal of the rejection of these claims is respectfully requested.

#### IV. Newly Added Claims

By the foregoing amendment, the Applicant has added claims 20 and 21 in order to claim various features of the invention. No new matter is added. Claims 21 and 22 are allowable since they recite similar features to those recited in claims 1 and 4, respectively.

#### V. Conclusion

In view of the above amendment, applicant believes the pending application is in condition for allowance.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 18-0013, under Order No. AIS-0008 from which the undersigned is authorized to draw.

November 17, 2004

Respectfully submitted,

By   
Toshikatsu Imaizumi

Registration No.: Limited Recognition Under  
37 C.F.R. § 10.9(b)  
RADER, FISHMAN & GRAUER PLLC  
1233 20th Street, N.W.  
Suite 501  
Washington, DC 20036  
(703) 955-3750  
Attorney for Applicant